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INVESTIGATION OF mechanical brush treatment methods

ED&T 2342
BROWSE CUTTER

SEPTEMBER 1973

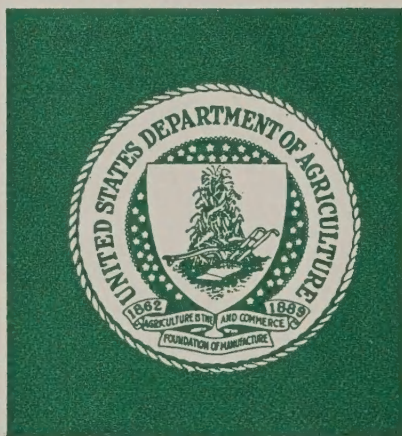


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INVESTIGATION OF MECHANICAL BRUSH TREATMENT METHODS

ED&T 2342,

BROWSE CUTTER

Δ/Δ+c Δ By

BEN J. LOWMAN. (—)

MECHANICAL ENGINEER

September 1973

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INTRODUCTION

Broadcast burning and chemical treatment are the most commonly used methods of improving wildlife habitat. Fire control and air pollution problems are encountered in broadcast burning. Use of herbicides is often restricted due to possible adverse side effects on desirable plants and animals. Other methods ranging from hand treatment with grubbers and chain saw, to motor-driven masticators have been used in specific areas with varying success.

Our approach under ED&T 2342 involved investigating methods of mechanical brush treatment without artificial seeding to improve game habitat and forage on west side Forests of the Northern Region (R-1). Experience has shown substantial increases in forage result when brush is chopped, mowed, crushed, or masticated to encourage resprouting. Primary interest is in a mechanical method that can be used effectively on west side Forests of Region 1. Most mechanical brush control efforts have been in areas other than R-1, and the terrain was considerably different from what we are considering. West side terrain is generally steep, rocky, and uneven with fragile soil conditions. Various methods, machines, and implements presently being used Service-wide are covered in this report, along with a brief discussion of prime movers. Information contained in this report is based on field contacts and reports, sales brochures, San Dimas Equipment Development Center project records, and a literature search. No testing or evaluating was done by MEDC on this project.

SURVEY OF NEEDS

To obtain present and projected use of mechanical browse treatment, contact

was made with six west side R-1 Forests, the Idaho Bureau of Land Management, and the following Regions:

Region 2 - Rocky Mountain
Region 3 - Southwestern
Region 4 - Intermountain
Region 5 - California
Region 6 - Pacific Northwest
Region 9 - Eastern

In addition, MEDC personnel visited the Colville, Clearwater, and Nezperce Forests. Topics discussed included areas considered applicable for mechanical treatment, present methods being used, projected needs, and the degree of treatment necessary to produce desirable results. Areas of interest in R-1 seem to be primarily on the Colville, Flathead, Kootenai, and Kaniksu Forests (table 1).

Other Regions are presently using brush saws, chain saws, and handtools to treat small areas. They are also experimenting with various mechanical methods. However, wildlife management people appear reluctant to put heavy equipment on steep slopes, due to possible environmental damage, even though the equipment might be capable of operating on the slopes.

The primary browse species being treated on west side Forests are serviceberry, willow, red stem and evergreen ceanothus. Colville personnel feel that breaking, bending, and mashing this brush is adequate for regeneration while some soil disturbance to break up root systems and scarify the ground is desirable. Crawler-type tractor tracks seem to do a satisfactory job of browse rejuvenation when "walked" over an area. This method of brush treatment has been tried but is slow and costly due to the number of passes required to treat an area. Various methods and machines are discussed in the ensuing sections.

Table 1.-- *Habitat manipulation survey*

<u>Forest</u>	<u>Areas receiving treatment Acres/year (estimate)</u>	<u>Percent suitable for mechanical treatment</u>
St. Joe	1,000-2,000 acres/year.	Are not interested in mechanical treatment.
Coeur d'Alene	300 acres/year.	Feel slopes are too steep.
Kaniksu	100-200.	3 percent.
Flathead	150-200.	50 percent.
Kootenai	1,000.	Undetermined.
Lolo	None currently being done.	Could only use narrow gage equipment.
Bitterroot	None currently being done.	No need foreseen for mechanical treatment.
Clearwater	11,000 acres are scheduled.	1 percent.
Colville	200 acres.	Undetermined.
Nezperce	2,600 acres.	About 5 percent.

Based on 1973 contacts with field units.

SPECIFIC REQUIREMENTS

Based on the data gathered in the problem analysis the following requirements must be met to achieve widespread use of mechanical treatment in R-1 brush control projects. The equipment must:

1. Be economical in comparison with handtools (cost/acre).
2. Be operable on slopes up to 45 percent and capable of traversing

small downfall, stumps, rocks, and brush stubble.

3. Have a cutting blade or blades capable of withstanding occasional contact with soil and rocks.
4. Have a browse cutter mounted on a prime mover large enough to support and power the cutting apparatus, yet small enough to work in a stand of timber.
5. Present no undue safety hazards.

BASIC TYPES OF MECHANICAL TREATMENT

1. Rotobeater Shredder

This category of mechanical brush masticator consists of flails, hammers, or swing-away blades attached to a high-speed rotating horizontal shaft. Machines of this type are usually large implements that chop, shred, and masticate brush and trees of fairly large diameter; converting them to mulch and result in a well-treated, eye-pleasing area. They are usually limited to relatively flat areas that aren't rocky. Fire hazard may result from hammers striking rocks.

Tritter.--Yeoman's Tritter Land Conditioner is in the rotobeater shredder category. The standard machine flails or hammers are driven by a P.T.O. at approximately 1,500 rpm. Another model has a 110 hp GMC diesel mounted as the power unit. This machine cuts brush 3-5 feet tall with a 60 inch swath. It is not, however, constructed to handle logging slash. Two types of cutting units are available. The first is a flail knife designed for pasture topping, shredding, and mulching. The other cutting unit is a hammer arrangement made from manganese steel weighing about 6 pounds each.

These hammers are rugged, and field reports indicated the hammers will pulverize small rocks and objects encountered in normal operations, except igneous rocks. The cutting unit consists of 28 knives or hammers with the cutting height adjustable from 1/2 inch to 8 inches. Slope limitations are under 40 percent maximum.

Shred King.--The Shred King, manufactured by Triumph Machinery Company, is a rotobeater shredder. A demonstration attended by Washington Office Equipment Development personnel was given near Springfield, Virginia. The model evaluated was the 8000-FE. This model contains an auxiliary 108 hp at 2,200 rpm engine to drive the shredder. The shredder is a 60-inch long drum consisting of 20 steel discs, 19 inches in diameter, and 38 free-swinging, stirrup-shaped cutters mounted between discs. The cutters are heat treated, high carbon steel and can be reversed for double service. The cutting height is adjustable from 1 inch to 5-3/4 inches; cutting a 60-inch swath. The weight is approximately 6,000 pounds. Production rate was estimated at 1-1/2 to 3 acres per day, and 20 percent was considered maximum effectively operable slope.

Due to lack of shielding, somewhat light construction for Forest work, and possible fire danger from duff buildup around the engine, a revised 73 model is now available. This model has a +20 percent slope capability, and with a different type engine oil pan it is possible to have a +30 percent capability.

The improvements have increased overall durability, operating efficiency, and safety. A 73 model 8000-FE may be purchased for use on the Kaniksu National Forest this year (fig. 1). Monitoring of field use would be desirable to further evaluate this machine.



Figure 1.--73 Model 8000-FE Shred King.

2. Rotary Blade

Mowers with one or more blades that rotate in a horizontal plane similar to a rotating blade lawnmower are in this category. Roanoke Robot and the Hydro Axe are two commercially available models. A Roanoke Robot was purchased and used in Region 1 for clearing brush along roads. The Roanoke Robot was also evaluated at San Dimas Equipment Development Center. Rotary blades present definite safety problems due to flying chips and other debris. R-1 had an incident where the blade was hurled up a hill and back at the operator similar to a boomerang. As a result of such safety problems, R-1 installed a Bomford Mower head, which is a drum-type rotobeater with swinging blades in place of the rotary blade (fig. 2). This has improved the safety of the machine.

Equipment Management personnel in R-1 feel that most rotary blade brush cutters present a definite safety hazard and should not be recommended if alternate methods are satisfactory.

3. Roller Drums

The rolling brush cutters consist of a cylindrical roller or drum equipped with several full-length cutting blades. The drums are usually hollow and filled with water to bring the cutter up to the desired weight. These roller drums can be pulled singly, in tandem, or in dual. The drum crushes and chops the brush while scarifying the ground. It has been used in Canada to break and chop poplar and will cut stems up to 4 inches in diameter when the soil is frozen and hard. When the soil is soft

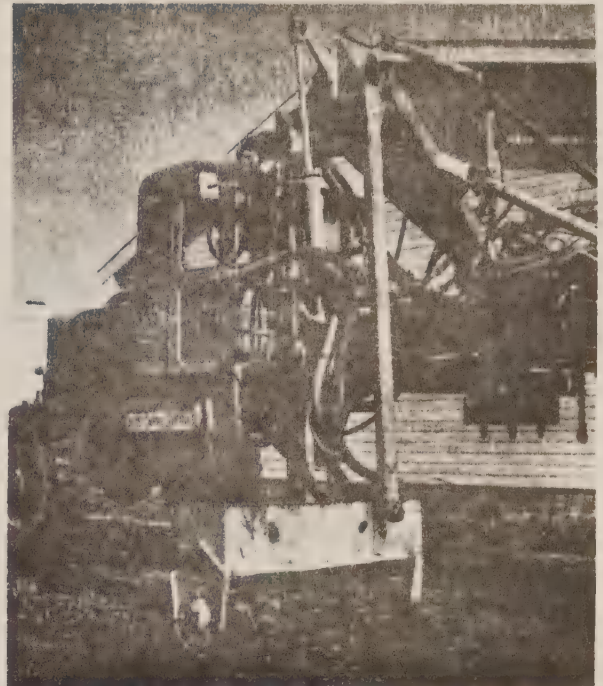


Figure 2.--Roanoke Robot modified with Bomford Mower head.

the limbs tend to be crushed into the ground rather than being chopped off. These rolling drums weigh anywhere from 1,500 pounds empty to 38,000 pounds when filled with water. "Slopes in excess of 25 percent usually exceed the tractor-towing limitation."^{1/}

The Colville Ranger District has a program of mechanical slash treatment in conjunction with T.S.I. work. They experimented with a Marden Brush Chopper pulled by a D-7 caterpillar tractor. Because of the size and weight of the chopper, this implement could only be used on 10 percent to 12 percent slope effectively. Large stumps and rocks were a problem and were bypassed.

^{1/} San Dimas ED&T report 7120-3, Tractor Attachments for Brush, Slash and Root Removal, January 1971, page 13.

A Tomahawk, manufactured by the Young Corporation, Seattle, Washington, was modified and mounted on the rear of a crawler-tractor (fig. 3).



Figure 3.--Tomahawk (modified).

The Tomahawk now has the capability of hydraulically raising, lowering and down pressure along with a free float position. It was used on the Colville to reduce fire hazard in slash and was effective on 45 percent slopes in light to medium slash and used on maximum slopes of 60 percent. This was used in conjunction with a browse cutting dozer blade (fig. 4) on the front of a crawler-tractor. This combination shows satisfactory results on slash. Green thinning operations present difficulty in chopping and crushing, as small trees and branches have a tendency to pass between the Tomahawk rings. Tomahawk or roller drum implements should be used with a front-mounted blade when operating in trees or large dense brush.

4. Chaining

Chaining consists of dragging a heavy chain in a "U" or "J" shape configuration between two crawler-tractors traveling in the same direction. The length and size of chains vary according to the terrain and cover type. The links vary from 25 to 90 pounds per link, with heavier links more effective on young, flexible trees and shrubs. The most common chain length is between 200 and 500 feet.

An optional method is to use one prime mover with a chain and attach the other end of the chain to a ball. The chain is usually a combination of destroyer, cargo, or cruiser ship chain approximately 150 feet long. The ball, a high tensile 3/16-inch steel plate submarine net float 58 inches O.D., weighs approximately 600 pounds empty and 4,300 pounds when filled with water. On ridgetops the prime mover straddles the ridge with the ball draped over one side. The ball pulls the chain downhill, and the extended chain crushes a strip of brush between the ball and the prime mover as it travels down the ridge. In flat or rolling

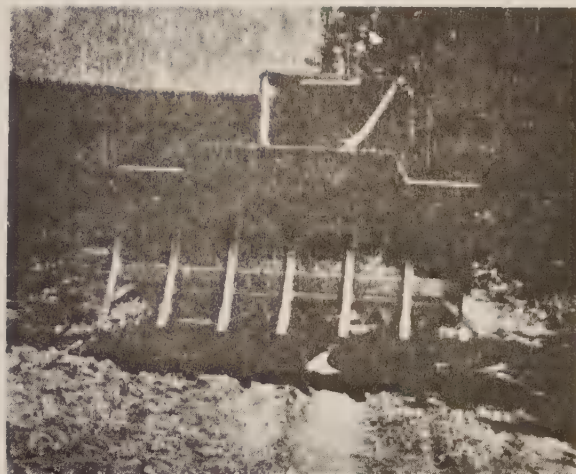


Figure 4.--Browse cutting dozer blade.

topography, a circling pattern is used, with the ball in the center

of the circle. This method results in a row of circles 200 to 250 feet in diameter. The submarine net float might need reinforcing when used in rocky areas and must be filled to capacity with water, or the thin walls are subject to collapse.

Chaining is suitable for a variety of terrains ranging from flat to 60-percent slopes that are rocky and rough. Steeper slopes can be treated by draping the ball over the side of a ridge and the prime mover traveling down the ridge. Large outcroppings of rocks should be avoided, however. Chaining is most effective on old dense brush and least effective on light stands of limber young brush.

Trees over 12 inches d.b.h. are difficult to handle. Different size prime movers, topography, and cover type will require variations in chain link combinations to provide desired clearing effect. Chaining has been used widely in the Southwest, Utah, and California; producing satisfactory results. Considering the terrain and cover type on west side Region 1, it appears doubtful that it would fill our requirements unless used in conjunction with burning.

5. Dozing

Probably the most widespread mechanical brush treatment method is bulldozing, which consists of a crawler-tractor with a hydraulic or cable-controlled pusher blade. Its uses are clearing and piling brush for burning or windrowing, shearing brush at or below ground level, and for uprooting large brush and trees.

It also has been used for walking over to mash or crush brush and cause regeneration.

Numerous front-mounted crawler-tractor blades are commercially available for specific applications. Some of the types are as follows:

- a. Rock Rake
- b. Multiapplication Rake
- c. Heavy-duty Clearing Rake
- d. Root Rake
- e. Brush and Cleanup Rake
- f. Stacking Rake
- g. V-Tree Cutter
- h. Clearing Blade

These are covered in San Dimas ED&T Report No. 7120-3, "Tractor Attachments for Brush, Slash, and Root Removal."

Front-mounted dozer blades used in conjunction with brush treatment implements usually has added to these implements' versatility in large brush, steep slopes, and other marginal areas of treatment. Trees and large brush can be knocked down and positioned with the blades for easier mechanical treatment.

PRIME MOVERS

Due to fragile soil conditions and steep terrain on the west side, prime movers were surveyed in hopes of increasing areas adaptable to mechanical treatment. Main emphasis being placed on crawler-tractors, rubber tired skidders, and large ATV's. Standard rubber tired farm tractors were deleted as they are unsuitable due to steep terrain requirements. Discussion and comparisons of specific prime movers were beyond the scope of this report.

1. ATV's

A wide spectrum of ATV's are presently on the market. The majority are intended for off-the-road transporting of personnel and supplies, rather than a prime mover designed for an implement capability. Typical characteristics are ground speeds from 0 to 25 mph, crawler-type tracks, and low ground pressure. Crawler-type tracks and low ground pressure (1-4 psi) allow these vehicles to negotiate softer ground than the standard crawler-tractors which have 6-8 psi ground pressure. Forty-five percent slopes are easily negotiated. ATV's have somewhat light construction and are designed for open ground. Moving and traversing over logs and stumps could present problems and cause excessive breakdowns.

These machines are not in common use on west side areas and would not be readily available for contracting. Parts and services are not available locally.

2. Rubber Tired Skidders

Rubber tired skidders are widely accepted prime movers in today's logging operations. Speeds normally range from 0 to 20 mph. After discussions with sales representatives and personnel familiar with rubber tired skidders, it was

felt that in areas suitable for mechanical treatment they could be used as prime movers. The skidder would have to be matched to the browse cutter power requirements. A crawler-tractor is a more versatile prime mover than a rubber tired skidder in work done by the Forest Service.

3. Crawler-Tractor

The crawler-tractor is the standard prime mover presently used on most brush treatment projects. It is a proven workhorse that is readily available in Region 1, being designed for use with a variety of implements. Brush control methods appear best suited to this type of prime mover. Crawler-tractors can easily negotiate 45 percent slopes and can be used in other areas, such as fire control, when not being used in brush control projects.

Ground pressure normally is 6-8 psi with speeds from 0 to 7 mph common.

In a program of testing various methods of mechanical brush treatment, the manufacturer's recommendations for prime movers should be considered. Where the treatment method is on an experimental basis, proven machines should be used. Other prime movers could be experimented with and comparisons made only after the mechanical treatment method has proved successful.

SUMMARY

Since this is an investigative project, no testing and evaluating of equipment was done by MEDC. All information contained in this report is based on field contacts and reports, sales brochures, SDEDC project records, and a literature search.

From information gathered, mechanical brush treatment was broken into five categories with similar characteristics. Under each category, specific implements were researched (tables 2 and 3). The implements that appeared to most closely fit field requirements were included. The categories and corresponding implements for mechanical brush treatment discussed are as follows:

1. Rotobeater Shredder

- a. Tritter
- b. Shred King

2. Rotary Blade

- a. Roanoke Robot
- b. Hydro Axe

3. Roller Drums

- a. Marden Chopper
- b. Tomahawk

4. Chaining

- a. Chain between two prime movers.
- b. Ball and chain with one prime mover.

5. Dozing

- a. Rakes
- b. Blades

The types of prime movers investigated were:

- 1. All-Terrain Vehicles
- 2. Crawler-Tractors
- 3. Rubber-Tired Skidders.

Table 2.-- *Evaluation of brush treatment methods*

<u>Browse cutting categories</u>	<u>Terrain limitations</u>	<u>No undue safety hazards</u>	<u>Browse treatment</u>	<u>Cost/acre (approx.)</u>	<u>Cutting blades can withstand occasional contact with soil and rock</u>
Rotobeater Shredder	20%-40%	Safe	Satisfactory	\$45-\$175	Yes
Rotary Blade	Prime mover limitations	Unsafe	Satisfactory	\$75-\$200	Questionable
Rolling Brush Cutters	25%-60%	Safe	Questionable	\$25	Yes
Chaining	40%-100%	Safe	Unsatisfactory	\$4-\$5	Yes
Dozing	40%-60%	Safe	Unsatisfactory	\$15-\$60	Yes

Table 3.-- Comparisons of brush treatment categories

Implement category	Production rate (approx.) Acre/hour	Maximum slope Percent (approx.)	Cost (approx.)	Cover	Typical prime mover	References
1. Rotabeater Shredder	.2-.8	20-40	\$35/hr*	Up to 6" dbh trees and brush	Crawler tractor Farm tractor	Range Development and Improvement. John F. Vallentine
a. Shred King	.2-.4	20-30 plus	Not available		Minimum gross weight 10,000 lbs. and lift capacity of 5,200 lbs.	Boone Y. Richardson and L. E. Matson, MO
b. Tritter	.2-.8	20-under 40	\$35/acre* estimate for heavy duty machine	Light-medium brush and chaparral	Minimum 45 hp. Manufacturer's recommendations	Memo--Riley A. Gilkey to Philip R. Shultz, USFS, San Dimas, California
2. Rotary Blade	.1-.3	Not available--prime mover limitations	\$15-\$20/hr*	Brush and stems up to 4" diameter	Grader, rubber-tired skidder, crawler tractor	Range Development and Improvement. John F. Vallentine
a. Roanoke Robot	.1-.2	Not available--used for roadside clearing	\$15-\$20/hr*	Brush encountered in roadside clearing	Grader, 70-90 hp.	SOEDC, Report #7700-1, Roanoke Robot
b. Hydro Axe	-----Safety problems with rotary blade category--information not gathered-----					
3. Rolling Brush Cutters	1	25-60	\$25/hr*	Brush and small trees	Crawler tractor. D-4 to D-7 or equivalent	San Dimas EDBT Report #7120-3, Tractor Attachments for Brush, Slash and Root Removal
a. Marden Brush Chopper	1	25	\$25/hr*	Brush and small trees	Crawler tractor. D-4 to D-7 or equivalent	San Dimas EDBT Report #7120-3, Tractor Attachments for Brush, Slash and Root Removal
b. Tomahawk	1	60	\$26/acre ground cost plus District overhead	Trees and brush on ground	Crawler tractor. D-4 to D-7 or equivalent	Colville RD personnel.
4. Chaining	8-10	40-100 slopes over 60% by ball and chain method	\$30-\$40/hr*	Variety; best on dense mature brush	Crawler type. D-5 to D-8 or equivalent	Range Development and Improvement. John F. Vallentine
5. Dozing	.5-2	40-60	\$25-\$30/hr*	Trees and brush	Crawler type. D-4 to D-8 or equivalent	Range Development and Improvement. John F. Vallentine

* Cost breakdown not available.

CONCLUSIONS

Our investigation revealed the following:

1. We found no commercially available equipment that could be used to mechanically treat browse on the steep, rough slopes now being managed for big game habitat in Region 1.
2. Even if equipment was available that could negotiate these slopes,

the land managers surveyed expressed their concern about the consequences of using heavy equipment on steep slopes with unstable soil.

3. Equipment is commercially available that can be used successfully on slopes up to approximately 30 percent.
4. Interest in equipment for use on favorable terrain was expressed by wildlife managers in several Western Regions.

RECOMMENDATIONS

Assist the Colville and Kaniksu Forests in their evaluation of mechanical equipment used in habitat manipulation. Also, provide engineering support in any modification that may become necessary.

APPENDIX

COPY
UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Equipment Development Center
Fort Missoula, Missoula, Montana 59801

REPLY TO: 7120 Equipment Development and Test

February 26, 1973

SUBJECT: ED&T 2342 - Browse Cutter



TO: Jim Lott, Project Leader

The following information was gathered at your request to determine the present use and the projected needs for equipment to mechanically treat browse plants to encourage resprouting. Regions 2, 3, 4, 5, 6, and 9 were contacted, as well as six west side R-1 Forests. These Forests are in addition to the contacts we made in person on the Colville, Clearwater, and Nezperce Forests.

R-1 Forests

1. St. Joe - Clyde Blake, Range and Wildlife Staff.

1,000-2,000 acres per year are scheduled for burning on the Forest. Slopes range from 40% to 60%. Access is a problem into these areas. The Forest has a general rule: No equipment on slopes over 40%. Two-thirds of Forest has bad soils problems. Blake does not see the need for mechanical treatment of browse in the near future on the St. Joe.

2. Coeur d'Alene - Gerald Stern, Range and Wildlife Staff.

They are treating about 300 acres per year, mostly by burning. A small amount of that acreage is done with chain saws. Species being treated are serviceberry, willow, and red stem ceanothus. Winter range on the Coeur d'Alene is too steep to use heavy equipment such as dozers.

3. Kaniksu - Emil Kulhanek, Range and Wildlife Staff.

Used the Hydro Axe on about 30 acres of browse last year. Appeared to do a good job. While there is access to most areas to be treated, most slopes are over 40%. Kulhanek estimates that only about 3% of the game ranges could be treated mechanically. They will burn about 80 acres this year. They could pay about \$5-\$10 per acre for treatment. Soils are fairly stable on the Kaniksu.

4. Flathead - Osborne Casey, Fisheries Biologist.

Have treated mountain maple, red stem ceanothus, and serviceberry with brush saws. Will do about 150-200 acres with saws this year. The

browse on the Forest occurs in scattered clumps that do not lend themselves to burning. No burning is planned on the Forest for browse regeneration. There are 10,000-15,000 acres of browse, one-half of which could be treated mechanically. The Flathead is interested in the project.

5. Kootenai - Jack Puckett, Resource Support Branch.

Have used dozers to walk down bitterbrush with good results. They are treating about 1,000 acres a year, mostly burning. Very little mechanical treatment being done, but more could be done in the future.

6. Lolo - Ken Young, Range, Wildlife Staff.

No browse treatment currently being done - funds are going for inventory work. Will start some burning next year. Most game ranges are on the west side of the Forest. The Lolo will be looking for ways to treat brush without fire, but need something man-portable or trail-portable. Would not have use for dozer-size equipment.

7. Bitterroot - Edmund Bloedel, Range, Wildlife Staff.

No browse treatment going on at the present time. Efforts are directed at planning. Most winter game ranges are located on private lands adjacent to the Forest boundary. Any key game ranges on the Forest are too steep for equipment use. Don't see the need for mechanical browse treatment in the foreseeable future.

Regions

Two - Rocky Mountain - Pete Greene, Wildlife Management.

Using brush saws on about 100 acres per year. Have used dozers on frozen Gambel oak. Also used the Marden chopper and chaining. Finances are the limiting factor in the Region, not terrain.

Three - Southwestern - Dale Jones, Wildlife Management.

Have used Marden chopper on slopes up to 20%. Most mechanical treatment has been done with chain saws and axes. Also used dozers on cliffrose and other larger species.

Four - Intermountain - David Gaufin, Wildlife Management.

Have used chain saws and axes on mountain mahogany, cliffrose and bitterbrush. Mechanical treatment in Region would be rather limited because of slope and small scattered treatment areas.

Five - California - Ed Schneegas, Wildlife Management.

Not doing much browse treatment in Region; are relying on grazing to increase browse production. Have done some work with rotobearer on bitterbrush with questionable results. Bitterbrush is most important browse species in Region and question the advisability of using a mechanical treatment on it.

Jack Carter, Fire Management (R-5)

Treating 10,000 acres per year in fuel modification program. Eighty percent of treatment is mechanical. Includes bulldozing and piling, Marden chopper, tritter, discing, and chaining. The purpose of the program is to convert from brush to grass. Bulldozing is the most commonly used method.

Six - Pacific Northwest - Paul Canutt, Wildlife Management

Bitterbrush is the species the Region is most concerned with. Have used chain saws to trim back. Have also used the tomahawk on the Deschutes and the Winema for bitterbrush treatment in conjunction with slash disposal. The treatment was detrimental to the bitterbrush plants. Have also used chain saws to trim back mountain mahogany with poor success. They don't see the need for mechanical treatment in the Region.

Nine - Eastern - Bob Radtke, Wildlife Management

A lot of wildlife habitat work is being done in the Lake States. The work consists of cutting tree species for resprouting; aspen, red maple, etc. They are using shear blades on cats. Their equipment needs are being met with conventional equipment. They do not need an equipment development effort to aid their program.

BLM - State Office - Idaho - Hugh Harper

BLM is doing hand clipping of bitterbrush and mountain mahogany. They have used a cat to disturb mountain mahogany with good result. BLM generally has land that is better suited for mechanical equipment, and they have more game ranges to work with than we do.

Summary

It appears that there is no pressing need at this time for mechanical browse treatment equipment on National Forest lands. Key game ranges in the West are typically on steep, rough slopes that in most cases are too steep for conventional prime movers. In addition, it appears

that Wildlife Management people are reluctant to put heavy equipment on slopes, even though the equipment might be capable of operating on the slopes.

The area of interest seems to be centered primarily on the Colville, Flathead, Kootenai, and Kaniksu Forests of Region 1. If a good system of mechanical browse treatment was perfected for the conditions found on those areas, other Regions might also have some interest in it. In summary, the need appears to be very small and restricted to limited areas in Region 1.

/s/ Richard G. Hallman

RICHARD G. HALLMAN, Staff Assistant
Resource Management

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Equipment Development Center
Fort Missoula, Missoula, Montana 59801

REPLY TO: 7120 Equipment Development and Test

January 23, 1973

SUBJECT: ED&T 2342 - Browse Cutter

TO: E. W. Amundsen



On January 16, we met with Clarence Almen, Range and Wildlife Staff Officer and Tom Burke, Wildlife Biologist on the Colville NF and Cliff Lehman, Forestry Technician on the Colville RD to discuss mechanical brush treatment. This Forest has a program of mechanical slash treatment in conjunction with TSI work, and have achieved good browse regeneration. They have used the Marden Chopper, but most of their work has been done with a special raker blade on the front of a dozer, and a Tomahawk on the rear. This system is covered in detail in the attached report. The Colville will have a D6-C under contract for brush disposal, thinning, and browse work next summer, and plan to treat about 200 acres. They offered to cooperate with us, so we could conduct some studies next summer if necessary.

We talked with Doyle Ward on the Kettle Falls RD, who stated that they have four or five sections of winter game range in Sherman Creek, that is part of a 1930 burn, that they would like to treat mechanically. This treatment would be exclusively for wildlife, and would not be done with TSI money. Evergreen ceanothus is the main species in this area, slopes are steep, and the soil is fragile, but based on their previous experience, they feel that most of the area could be treated mechanically.

All of the Colville personnel feel that it is not necessary to cut or mow the brush to get regeneration, but that breaking, bending, and mashing the brush is adequate, and that some soil disturbance to break up root systems and scarify the soil slightly is desirable. The dozer tracks do a good job of this.

On January 17, we met with Don Jenni, Wildlife Biologist on the Clearwater NF. Due to the steep terrain (average slope over 50%) and fragile soils, mechanical treatment could be considered on only about 1% of the areas scheduled for treatment. The present system of burning costs from \$2.00 to \$3.25 per acre direct costs. The following areas are scheduled for habitat manipulation in cooperation with the Idaho Fish and Game Department:

Nezperce NF	2,600	acres
Clearwater NF	11,000	"
St. Joe NF	2,350	"
Coeur d'Alene NF	300	"
Kaniksu NF	120	"

Don feels that the present burning system is adequate, and that they do not have any restrictions on spring burning.

We also contacted James Harvey, Resource Coordinator, Clearwater N.F. and Forrest Hayes, Resource Assistant, Selway R.D. Both feel that mechanical treatment would be limited to less than 5% of their areas due to steep slopes, fragile Idaho Batholith soil, and limited access.

J. R. Lott
J. R. LOTT
Mechanical Engineer

R. G. Hallman
R. G. HALLMAN, Staff Assistant
Resource Management

Enclosure

